THE UNIVERSITY OF DANANG

UNIVERSITY OF SCIENCE AND TECHNOLOGY

FACULTY OF ROAD AND BRIDGE ENGINEERING

PROGRAM SPECIFICATION

UNDERGRADUATE PROGRAM IN

TRANSPORTATION CONSTRUCTION ENGINEERING

CODE: 7580205

Danang, August 2015

TABLE OF CONTENTS

I. PROGRAM DESCRIPTION

1.1. Program Introduction

The program of Transportation Construction Engineering (TCE) - Faculty of Road and Bridge Engineering (FRBE), The University of Danang – University of Science and Technology was established in 1986. In 1986, the first enrollment of this program was launched, under professional management of Road and Bridge division - Faculty of Civil Engineering.

The education program of TCE was initially based on the core program of the Ministry of Education and Transportation Construction Engineering of National University of Civil Engineering (UCE). In 2006, the program was changed to the credit-based system, consisting of 214.5 credits (CR) within 5 years. Then, it dropped to 179 credits in 2009 and 153 credits in 2012. Recently, the study duration has decreased to 4.5 years by 2015.

With high-quality human resources that have graduation from universities or postgraduate from prestige institutes of bridge and road technology, together with conditions for facilities for teaching and studying in term of synchronization and modern property, the TCE program - FBRE aims to be a high quality institute for human resource training, scientific research and technology transfer to contribute positively to the development of bridge and road engineering of the Central and Highlands, Vietnam and Southeast Asia region.

1.2. General Information

The general information of TDE program is showed in the Table 1.1.

Table 1.1 General Information of the TCE program

1. Program title:	Transportation Construction Engineering (TCE)
2. Level:	Undergraduate
3. Type of diploma:	Engineer
4. Mode of study:	Full time
5. Study duration:	4.5 years
6. Total of credits:	153 (exclude Physical Education & National Defense Education)
7. Management Faculty:	Faculty of Road and Bridge Engineering (FRBE)
8. Language:	Vietnamese
9. Professional accreditation:	On-going AUN assessment
10. Website:	http://cauduongbkdn.dut.udn.vn
11. Facebook	https://www.facebook.com/cauduongbkdn/
12. Issue:	August, 2015

1.3. Educational Phylosophy of DUT

With regards to the mission of training high-quality human resources in science and technology and providing scientific and technological services for the development of the Central - Highlands, DUT has built an educational philosophy: "*thinking, creating and humanity cherishing*".

The educational philosophy of the DUT is described in detail throughout the TCE program, which is showed in the Table 1.2.

Table 1.2 The educational philosophy of the DUT is described in the TCE program

TCE Program			The educational philosophy		
			Thinking	**Creating**	**Humanity Cherishing**
Courses Classification	General courses	Science, Math, Statistics, Foreign Languages, Informatics	X	X	
		Political courses, Law, Ho Chi Minh Thought			X
	Fundermental courses in civil engineering	Theorical courses (Strength of Materials, Geology, Construction Materials, Soil Mechanics, Surveying, Foundation)	X		
		Project courses (Reinforced Concrete, Foundation)	X	X	
		Laboratory and Practice courses (Geology, Surveying, Construction Materials, Soil Mechanics)	X	X	
	Professional courses in TCE	Theorical courses (Bridge Design, Road Design, ...)	X		
		Project courses (Bridge Design, Road Geometric Design, ...)	X	X	
		Laboratory and Practice courses (Worker Practice, Field Trips, Internship)	X		
	Final project (Graduation Project)		X	X	

Extra Activities	Students' scientific research		X	X	
	Design competition, Ideas competition		X	X	
	Student volunteer (Green summer)				X
	Blood donation				X
	Charity campains for the poor, disasters' victims				X
Program Learning Outcomes (PLOs)	PLO1	Apply the fundamental science for professional work	X		
	PLO2	Design and construct the infrastructures in traffic construction engineering	X	X	
	PLO3	Use the technical equipment to perform measurement and testings, to analyze data.	X		
	PLO4	Apply informatics for professional work.	X		
	PLO5	Communicate, present and write report effectively.	X		
	PLO6	Figure out, analyze and solve the technical problems in traffic construction engineering.	X	X	
	PLO7	Work independently, have critical thinking effectively and work as a team efficiently.	X		
	PLO8	Demonstrate understanding of the society, environment, laws and development orientation of the country.			X
	PLO9	Use foreign language in the professional work.	X		
	PLO10	Continue learning lifelong.	X	X	
	PLO11	Have the professional ethics and be responsible to society and environment.			X

1.4. Vision and Mission of the FBRE

1.4.1 Vision

The Faculty of Road and Bridge Engineering will become the leading and competitive faculty in research and training of the Transportation Construction Engineering in the Central area, the Highlands and Vietnam.

1.4.2 Mission

The Faculty of Road and Bridge Engineering is the training centre which provides the qualified human resource in Transportation Construction Engineering and Construction Material Engineering. The Faculty provides scientific and technical solutions to serve the socio-economic development of the Danang city, the Central area, the Highlands, and Vietnam.

1.5. Program Objectives (POs)

General Objective:

The general goal is to provide the qualified human resource which can serve the development of Transportation Construction Engineering in the Central area and the Highlands, in Vietnam and Southeast Asia.

Specific Objectives:

- *In terms of knowledge*

+ PO1: Understand deeply the fundamental science in order to continue learning throughout life

+ PO2: Have wide and broaden knowledge in the major in order to solve problems in transportation construction engineering and traffic planning.

- *In terms of skills:*

+ PO3: Have skills of communication, teamwork, leadership, problem solving, critical thinking and creativity.

+ PO4: Use foreign language and applied informatics well.

- *In terms of ethics:*

+ PO5: Have the professional ethics and be responsible to society and the environment.

1.6. Program Learning Outcomes (PLOs)

Graduates from TCE program are able to:

1. Apply the fundamental science for professional work
2. Design and construct the infrastructures in traffic construction engineering
3. Use the technical equipment to perform measurement and testings, to analyze data.
4. Apply informatics for professional work.
5. Communicate, present and report effectively.
6. Figure out, analyze and solve the technical problems in traffic construction engineering.
7. Work independently, have critical thinking effectively and work as a team efficiently.
8. Demonstrate understanding of the society, environment, laws and development orientation of the country.

9. Use foreign language in the professional work.
10. Continue learning lifelong.
11. Have the professional ethics and be responsible to society and environment.

Relationship between POs and PLOs is showed in the Table 1.3. It proves that if students achieve the PLOs, they will achieve the POs either.

Table 1.3 Relationship between POs and PLOs.

Program Ojectives (POs)	Program Learning Outcomes (PLOs)										
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**
PO1	X									X	
PO2	X	X	X			X		X			
PO3			X		X	X	X			X	
PO4		X		X					X		
PO5								X			X

1.7. Job and Graduate Study Opportunities

Graduates from TCE program have ability to:

1. Perform technical tasks, quality management at industrial sectors in transportation infrastructures.
2. Consult and design works at of transportation infrastructures companies, urban planning departments.
3. Perform construction works for transportation infrastructures such as bridges, draining system, roads, and tunnels
4. Work for government sectors in transportation infrastructures
5. Conduct research works at transportation infrastructures institutes
6. Teach courses in transportation infrastructures such as Soil Mechanics, Structural Foundation, Mechanics of Materials, Structural Analysis, Reinforced Concrete Structures, Bridge Engineering, Road Engineering, Transportation Planning and Managements, Computer-aided for Civil Engineering, etc. at universities, colleges, and vocational training school.
7. Attend graduated schools.

1.8. Admission Criteria, Training Process and Graduation Conditions

1.8.1. Admission Criteria

The TCE program accepts candidates that meet the following requirements:

1. Have graduated from high school;
2. Registering the national examination of the A field (mathematics, physics and chemistry) and the A1 field (mathematics, physics and English) for TCE major;
3. Have the national examination grade greater than or equal to the entry grade of the TCE program and DUT.

1.8.2. Study Process

The TCE program curriculum is organized following the study credit-based system. The training process complies with the regulations of the Ministry of Education and Training, the University of Danang (UD) and DUT. The program is implemented in 4.5 years. Each scholar year consists of two main semesters (mid-August to late June) and one summer semester (from early July to mid-August). In the first two years, students learn basic and fundermental knowledge, in the next two and half years, students learn knowledge of the major.

1.8.3. Graduation Conditions

Student must meet the following conditions:

1. Accumulating sufficient number of credits and volumes of the training program;
2. The cumulative GPA at least 2.00 or higher;
3. Having a certificate of defense education and physical education;
4. Achieving the standard of the foreign language according to the DUT's regulations;
5. Achieving the standard of information technology in accordance with the DUT's regulations.

1.9. Teaching and Learning Strategies

FRBE has developed teaching and learning strategies, methods and focused on developing all resources, facilitating the implementation of teaching and learning. These teaching strategies and methods help to achieve effective teaching.

A variety of teaching and learning activities are applied to help students not only gain the basic and social knowledge, but also use this knowledge to collaborate with others and develop their skills and strong points. Then, personal skills such as communication, negotiation, teamwork skills… are formed.

The teaching strategies and methods used in the education program are as following:

1.9.1. Direct Instruction Strategy

Direct instruction strategy convey information directly to the students, teachers present and students listen. This teaching strategy is often applied in traditional classes and shows its effectiveness when transfering basic information, explaining a new skill.

The teaching methods following this strategie applied by TCE includes explicit teaching, lecture, and guest lecture.

1. Explicit Teaching: This is one of direct instruction strategy in which teachers advise and explain in detail the lesson content, help students achieve the teaching goal of knowledge and skills.

2. Lecture: Teachers present and explains the lecture contents. Teachers are presenters, lecturers. Students only listen to lectures and occasionally take notes to receive the knowledge

3. Guest Lecture: Students participate in courses where lecturers are not teachers but man from business. Through the experience and understanding of the lectures, they help students form an overview or specific knowledge on the field.

1.9.2. Indirect Instruction Strategy

Indirect instruction strategy is a teaching strategy in which students are facilitated in the learning process without any public teaching activities undertaken by teachers. This is teaching process approaching towards students, a student-centered approach, which instead of directly tranfering the content of the lesson to the student, the advisers encourage them to participate in the learning process and to use their critical thinking skills to solve problems.

The teaching methods following this strategie applied by TCE includes: Inquiry, Problem Solving, Case Study.

4. Inquiry: In the teaching process, teachers use open questions or problems, and advise students to answer questions step by step. Students can participate in group discussions to solve problems together.

5. Problem Solving: In the teaching and learning process, the students work on the problems and learn new knowledge by facing thses problems. By finding solutions to the problem, students acquire the knowledge and skills required by the course.

6. Case Study: This is a method of student-centered approach which helps students to form critical thinking and communicate skills. In this approach, teachers pose practical situations, problems or challenges and ask students to solve them. This could help students create problem-solving, decision-making and research skills.

1.9.3. Experiential Learning

Experiential learningis a teaching strategy in which students acquire knowledge and skills through practical experience, observation and perception. They learn from doing and experiencing.

The teaching methods following this strategie applied by TCE includes: models, field trip, experiment, and teaching research team.

7. Models: Models are the teaching method in which students acquire knowledge and skills through observation, construction process and model design required by teachers.

8. Field Trip: Through visits, internships and field trips, students could understand the prctical working environment of their major. Morevoer, they could learn the technology applied, form professional skills and working culture in companies. This method not only helps students form their knowledge and skills but also creates career opportunities after graduation

9. Experiment: Teachers do experimental manipulations, then students observe and practice those experiments under teacher advising. By this way, teacher can target to their teaching purpose.

10. Teaching Research Team: Students are encouraged to participate in research and teaching projects and groups, which help them create research and creative skills. As a result, students could be able to continue studying at the masters and doctoral level after graduation.

1.9.4. Interactive Instruction

Teachers combine a number of acivities in classroom such as posing problems or open questions and asks students to discuss and solve problems. Teacher, as a adviser, help students step by step to solve problems. This helps students achieve their learning goals. Students can learn from their classmates or teachers to develop social skills, critical thinking skills, communication, and negotiation to make decisions.

The techniques and methods used by TCE in this strategy are: Debate, Discussions, Pear Learning.

11. Debates: Debates is a teaching process in which teachers pose a problem related to the lesson content, then students with opposing views must analyze, explain and persuade others to support their point. Through this teaching activity, students develop skills such as critical thinking, negotiation and decision making, or public speaking skills.

12. Discussion: Students are divided into groups and participate in discussions about the viewpoints on a given topic. In contrast to the debate method, students share the same common goal and find ways to improve their viewpoints and solutions in the discussion method.

13. Pear Learning: Students are organized into small groups to solve problems together and present group results through reports or presentations to other groups and lecturers.

1.9.5. Independent Study

Independent study means that all learning activities of students conducted by individual students with little or no teacher advising. This is a process that helps students orient their learning from their own learning experiences, they have autonomy to control their learning activities through assignments, projects or problems suggested or advised by teachers on class.

The methodology of this strategy is mainly applied by TCE as Work Assignment

14. Work Assigment: According to this method, students are assigned homework with contents and requirements given by teachers. By completed the homework, students learn independent study, as well as required knowledge and skills.

The above teaching and learning methods help students acquire the PLOs, as shown in the Table 1.4.

1.10. Strategies and Assessments

1.10.1 Assessments

Learning assessment is noting, recording and providing information about the progress of the students during the teaching process. The assessment ensures the principle of clearness, exactness, objectiveness and differentiation, continuity and periodicity. Specific requirements and criteria, designed and published by FRBE, are clarified before learning process.

Assessment information is timely provided and shared with stakeholders including teachers, students, parents and administrators. Then, they could timely do adjustments in teaching activities to ensure direction and achieve teaching goals.

Table 1.4 Mapping between PLOs and Tecahing-Learning Strategies and Methods

Strategies and Methods of Teaching-Learning	PLOs										
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**
I. Direct Instruction											
1. Explicit Teaching	X	X	X	X					X		
2. Lecture	X	X	X	X				X	X		X
3. Guest Lecture		X			X			X			X
II. Indirect Instruction											
4. Inquiry		X				X					
5. Problem Solving						X	X				
6. Case Study						X				X	
III. Experiential Learning											
7. Models		X		X							
8. Field Trip								X			X
9. Experiment			X								
10. Teaching Research Team						X				X	
IV. Interactive Instruction											
11. Debates		X			X		X				
12. Discussions		X			X		X				
13. Peer Learning		X			X		X				
V. Independent Study											
14. Work Assigment	X			X			X		X	X	

FRBE has developed and applied a variety of assessment methods. The strategy, teaching methods and requirements of standard outcomes of each course are the factors to select the appropriate assessment methods, ensure adequate information to assess the student learning progress, as well as the effectiveness of the teaching process.

The assessment methods used in FRBE education programs are divided into two main categories: On-going/Formative Assessment and Summative Assessment.

➢ **On-going/Formative Assessment**

The purpose of the formative assessment is to timely provide feedback from teachers and students about progress and issues needed to fix during instruction.

Specific methods of formative assessment used by the TCE include: Attendance Check, Work Assignment, and Oral Presentation.

1. Attendence Check

Beside independent study, regular attendance as well as contributions of student during the course also reflects their attitudes towards the course. Attendence check are conducted by Rubric 1 or 2

depending on the theoretical or project course

2. Work Assigment

Students are required to do some content related to the lesson during class or after class. These exercises can be done by individual or groups and are evaluated according to the specific criteria in Rubric 3.

3. Oral Presentaion

Some courses in the TCE curriculum ask students to work as a team to solve a problem, situation or content related to the lesson and present their results to other groups. This activity not only helps students gain specialized knowledge but also helps students develop skills such as communication, negotiation, teamwork skills. To assess the level of achieveing these skills, Rubric 4 may be used.

➢ **Summative Assessment**

The purpose of this type of assessment is to give conclusions, categorize the level of achievement and quality of the output, the progress of the students at a certain point of teaching time. It includes end of learning assessment, midterm assessment, and final assessment.

The methods used by TCE in this assessment include: Written Exam, Multiple Choice Exam, Oral Exam, Written Examination, Written Exam, Report, Oral Presentation, Teamwork Assesment and Peer Assessment.

4. Written Exam

According to this method, students are asked to answer a number of questions, exercises or personal opinions about issues related to the knownledge requirements of the course and the assessment is based on designed answers. The rating scale used in this assessment is the scale of one to ten. The number of questions in the assessment is designed according to the content requirements of the course.

5. Multiple Choice Exam

This method is similar to the written exam, in which students are asked to answer questions based on the designed answer. The different point is that in multiple choice exam, the student answers are based on the suggested answers designed and printed in the test.

6. Oral Exam

In this method, students are assessed through interviews, directly questions and answers. Criteria of this method are described in Rubric 5.

7. Written Report

Students are assessed through the their report, including the content presented in the report, the manner of presentation, the drawing/picture in the report. Criteria of this method are according to Rubric 6.

8. Oral Presentaion

This method is exactly the same as the presentation assessment method in the Rubric 4. The assessment is performed periodically (mid-term, final exam or end-of-course).

9. Peer Assessment

Peer assessment are used when applying teamwork activities to evaluate students' teamwork skills. Criteria are followed Rubric 7.

Table 1.5 Mapping between Assessment methods and the PLOs

Assessment methods		PLOs										
		1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**
I	**On-going/Formative Assessment**											
1	Attendence Check	X	X						X	X		X
2	Work Assigment	X	X		X			X		X	X	
3	Oral Presentaion					X	X	X				
II	**SUMMATIVE ASSESSMENT**											
4	Written Exam	X	X	X	X			X	X			X
5	Multiple choice exam	X						X		X		X
6	Oral Exam		X	X		X	X	X				
7	Written Report	X	X	X	X	X	X	X	X		X	
8	Oral Presentaion					X	X	X		X		
9	Peer Assessment					X	X	X			X	

1.10.2. Rubrics

Based on the assessment methods, FRBE has developed specific tools and criteria for conducting student assessments by Rubrics. The reasonable assessment method and rubrics could be chosen depending on the requirements, the objectives and characteristics of each subject. In the same assessment method, it is possible to apply different Rubrics for different modules.

The Rubrics are elaborated in accordance with the assessment method in the TCE curriculum. The details of rubics are presented as follow:

1. Attendace Check

Rubric 1: Class Attendance

Assessment Criteria	Levels of achievement					Weight
	Level F (0-3.9)	**Level D (4.0-5.4)**	**Level C (5.5-6.9)**	**Level B (7.0-8.4)**	**Level A (8.5-10)**	
Diligence	< 30%	<50%	<70%	<90%	100%	**50%**
Class activities	Never participate in any class activity	Rarely participate in any activity. Inefficiently contribution.	Occasionally participate in class activities. Inefficiently discussion.	Regularly discuss and exchange ideas related to the lesson. The contribution to the lesson is effective.	Always participate in class activities: speaking, exchanging ideas related to the lesson. The contributions are very effective.	**50%**

Rubric 2: Project Attendance

Assessment Criteria	Levels of achievement					Weight
	Level F (0-3.9)	**Level D (4.0-5.4)**	**Level C (5.5-6.9)**	**Level B (7.0-8.4)**	**Level A (8.5-10)**	
Group organisation	Group is completely broken: The responsibilities and duties of the team members are not specifically assigned, no association, team coordination.	The responsibilities and tasks of each team member are unclear, not suitable to their abilities. There is no coordination between team members.	Each member has his / her own task but is unclear and incompatible with the member's ability. The teamwork is not good.	The task of each team member is clear and relevant to their abilities. Good coordination of the team.	The duties of the team members are clear and consistent with their abilities, promoting the strength of the members. The teamwork is very good.	**35%**
Diligence	< 30%	<50%	<70%	<90%	100%	**30%**
Discussion	Never participate in group discussions	Rarely participated in group discussions and comments	Occasionally participate in group discussions and comments	Regularly participate in group discussions and contribute to discussions among groups.	Always participate in group discussions and contribute effectively to group activities and groups.	**35%**
Content is as schedule	No calculated content.	Incomplete calculations (<50%), wrong calculation results, unsuitable calculation sequence.	Calculation content includes enough volume as listed in the schedule (100%). Calculated results are some errors, mistakes.	Calculation content includes enough volume as listed in the schedule (100%). Calculated results are correct, calculation softwares are used but not appropriate.	Calculation content includes enough volume as listed in the schedule (100%). The sequence of calculation steps is reasonable. The results are calculated correctly.	**50%**

Assessment Criteria	Levels of achievement					Weight
	Level F (0-3.9)	Level D (4.0-5.4)	Level C (5.5-6.9)	Level B (7.0-8.4)	Level A (8.5-10)	
					Calculation softwares are used reasonable	
Format of reports	No report or report are incomplete.	Messy display in report, incorrect order. Drawings, tables and symbols used in the report are inappropriate.	The display of report is appropriate. There are some spelling errors, some confusion about size, notes, explanation parameters, tables.	Content is suitable. Structure of report is clear, logical. Notes, explanations, drawings, tables are suitable. There are few errors.	Content is suitable. Structure of report is clear, logical. Notes, explanations, drawings, tables are suitable.	**25%**
Technical drawings	No drawings or drawings lacking parts or images as required. The content is not correct	Drawings are not complete, unclear and lack dimension. Composition details, the content on the drawing are as required but still contain many errors. Notes are not appropriate.	The drawings show the required images, but the layout does not fit, and some minor flaws in presentation. Content on the drawing is as required.	Drawings include full details, clear size. Content is expressed as required. Drawings are Arranged and present reasonable. Notes are clear, detailed.	Drawings include full details, clear size. Content is expressed as required. Drawings are Arranged and present reasonable. Notes are clear, detailed. Drawings can be implemented in reality	**25%**

2. Work Assignment

Rubric 3: Work Assignment

Assessment Criteria	Levels of achievement					Weight
	Level F (0-3.9)	Level D (4.0-5.4)	Level C (5.5-6.9)	Level B (7.0-8.4)	Level A (8.5-10)	
Submit assignment	Do not submit assignment	Submit 70% assignment. Incorrect time.	Submit full assignment (100% of the assignment). Some assignments are not in time.	Submit full assignment (100% of the assignment). Most assignments are submitted on time.	Submission of full assignments (100% of the assignment). At regulation time.	**20%**
Presentation of assignment	Do not do exercises	Messy display, not in accordance with presentation requirements (font, size, line). Figures and tables used in the exercise do not match.	The exercise meets the requirements (font, size, line). Drawings and tables used in the exercises are clear and appropriate. There are some minor defects in presentation (misspelling, mistake, size)	The presentation is beautiful, and meets the requirements (font, size, line). Drawings and tables used in the exercises are clear and appropriate. Note, full explanation, reasonable.	The presentation is beautiful and meets the requirements (font, size, stream). Drawings and tables used in the exercises are clear and appropriate. Note, full explanation, reasonable.	**30%**

Content of the exercise	Do not do exercises	Inadequate content, some incorrect according to task requirements.	The content of the exercise is adequate, meets the requirements of the task but not reasonable. There are some errors in the calculation.	The content of the exercise is adequate, reasonable, and meets the requirements of the task. Correct calculation.	The content of the exercise is adequate, reasonable, and meets the requirements of the task. perfectly calculation.	**50%**

3. Oral Presentation

Rubric 4: Oral Presentation

Assessment Criteria	**Levels of achievement**					**Weight**
	Level F (0-3.9)	**Level D (4.0-5.4)**	**Level C (5.5-6.9)**	**Level B (7.0-8.4)**	**Level A (8.5-10)**	
Content of presentation	No content or content is inappropriate for the request.	Content matching requirements, images and explanations are not clear	Content meets requirements. Use simple and easy to understand terminology. The picture is clear and beautiful	Content meets requirements. Use simple and easy to understand terminology. Pictures are clear, and beautiful. Used video	Content meets requirements. Use simple and easy to understand terminology. Pictures are clear and beautiful. Use video and explain specific insights on video.	**50%**
Slide presentation	Slide presentation is too sketchy, not enough quantity as prescribed	Slides are presented in appropriate quantities, using the word and picture clearly	Slides are presented with a clear, layout (introduction, body and conclusion)	Slides are presented with clear, logical layout, consists of 3 parts, demonstrating proficiency in presentation.	Slides are presented with clear, logical layout, consists of 3 parts. The term is simple to understand, demonstrating proficiency in presentation and language.	**25%**
Presentation	The presentation is not logical, beyond the specified time, uses of incorrect terminology, unclear pronunciation, low voice. Listeners do not understand.	The presentation is full, but the voice is low, pronouns some words unclear, uses complex terminology, do not contact with the listener when presented.	The presentation has a clear three-part layout. The voice is reasonable, clear, easy to listen, time is properly presented, sometimes interact with the listener. Listeners can understand and keep track of the content presented.	The presentation is brief, easy to understand, uses simple and easy-to-understand terms. Clear layout. The voice is clear and fluent. Time to present correctly. Good interaction with the listener. Listeners can understand the content.	The presentation is brief with clear layout. The voice is clear and fluent. Attract the attention of the listener, interact well with the listener. Listeners can understand and keep up with all the content presented. Time to present correctly.	**25%**

4. Written Exam: In 10-scale and follow the designed rubics

5. Multiple Choice Exam: In 10-scale and follow the designed rubics

6. Oral Exam

Rubric 5: Oral Exam

Assessment Criteria	Levels of achievement					Weight
	Level F (0-3.9)	**Level D (4.0-5.4)**	**Level C (5.5-6.9)**	**Level B (7.0-8.4)**	**Level A (8.5-10)**	
Ansering Attitude	Communicating and answering attitude is rude, not cooperated, lack of respect in communication. Use inappropriate terms. Voice is hard to listen.	Attitude is quite polite. Use complex terms, confusing answers, hard to understand. Small voice, lack of confidence.	Communicative attitude is, gentle. The voice is clear, easy to hear. The term used in the answer is appropriated, easy to understand.	Attitude in the answer is confident, calm, gentle. Use simple terms, easy to understand. Clear voice fluently speak.	Attitude is very confident. Voice is clear, fluent and attractive, well interact with the listener.	**30%**
Answer questions	The answers are completely unrelated to questions.	Answers are not clear, almost unconnected, not focus on the question.	Answers focus on questions. The lack of confidence in the answers.	The answers are concise, clear, completed, relevant to the question asked. Attitude in answering is confident, calm, gentle, calm.	Answer shortly, clearly, completely, directly related to the question asked, explain convincely. Attitude in answering is confident, calm, persuasive.	**70%**

7. Written Report

Rubric 6: Written Report

Assessment Criteria	Levels of achievement					Weight
	Level F (0-3.9)	**Level D (4.0-5.4)**	**Level C (5.5-6.9)**	**Level B (7.0-8.4)**	**Level A (8.5-10)**	
Contents	No content or content is not matched with requirements	Content is fully represented in the report as requirements. The calculation is incorrect, is not specific, does not meet requirements	The report includes enough content as required. There are some mistakes in calculation. The calculation is still not reasonable.	The report includes enough content as required. The step of calculation is appropriate. The calculation is correct. There is not specific and reasonable explanation for the calculation results	The report, the calculation, the step of calculation is appropriate. There is specific and reasonable explanation for the calculation results	**60%**
Organization, format, language	No report or the content in report does not meet requirements.	The order presented in the report is incorrect. The content meets the requirements. Drawings and tables are contradictory to the content.	The content, order and format of report are as required. There are some spelling errors, sizes. Notes are not enough.	Suitable content. The order and structure of projects are logic, clear and meet requirements. Figures and tables are logic and clear. Writing skills are limited.	Same as level B. Show advanced IT skills in conducting projects.	**20%**
Drawings	There is no or lack of drawings	Enough number of drawings with the content as prescribed.	Enough number of drawings; Size, notes on the	Enough number of drawings with content in accordance with	Same as level B. Show advanced IT skills in	**20%**

Assessment Criteria	Levels of achievement					Weight
	Level F (0-3.9)	**Level D (4.0-5.4)**	**Level C (5.5-6.9)**	**Level B (7.0-8.4)**	**Level A (8.5-10)**	
	or drawings are not in accordance with regulations.	Dimensions, notes on the drawing are not expressed or not clear, some parts on the drawings.	drawings are clear. There are some errors in the display of drawings (misspelling, strokes).	regulations. Size, notes on the drawings are clear.	drawing projects. Drawings can be implemented.	

8. Oral Presentaion: Same as Rubic 4

9. Teamwork Assessment

Rubric 7: Teamwork Assessment

Assessment Criteria	Levels of achievement					Weight
	Level F (0-3.9)	**Level D (4.0-5.4)**	**Level C (5.5-6.9)**	**Level B (7.0-8.4)**	**Level A (8.5-10)**	
Group organisation	There is no teamwork	The responsibilities and tasks of the team members are not specifically assigned.	Each member has his or her own job duties but is unclear and does not fit the abilities of the team members.	Job assignments are clear and relevant to the abilities of each team member.	The task of each member is clear, specific, appropriate. Promote the strength of the team members. Interaction, good coordination between members.	**30%**
Diligence	< 30%	<50%	<70%	<90%	100% (Participate in full meetings, groups discussion)	**20%**
Discussion	Never participate in group discussions.	Rarely participated in group discussions and comments.	Occasionally participate in group discussions and comments.	Have a good group discussion and good comments.	Always participate in group discussions and contribute good ideas for group activities.	**20%**
Group Co-ordination	Never coordinate, cooperate with groups.	Rarely collaborated, teamwork.	Collaborate, collaborate with the team. Occasionally respect and share experiences from other members of the group.	Collaborate, collaborate with the team. Respect and share experiences from other members of the group.	Collaborate with the team. Always respect and share experiences for other members of the group.	**20%**

1.11. Grade System

DUT uses the following scoring systems to assess student's academic performance:

- Scale 10 is used to evaluate courses including component grades, final test grades, and courses grades. Course grades are the summation of all component grades multiplied with corresponding weights.
- Scale letter is used to classify learning outcomes based on student's course grades.
- Scale 4 is used when calculating the semester average grade and the cumulative GPA, to assess the student's academic performance after each semester and to grade the student's overall academic performance.

Table 1.8 Grade system of DUT

Classification		Scale 10	Scale letter	Scale 4
Pass	Above sufficient	From 9.5 to 10	A+	4.0
		From 8.5 to 9.4	A	4.0
	Sufficient	From 8.0 to 8.4	B+	3.5
		From 7.0 to 7.9	B	3.0
	Developing	From 6.5 to 6.9	C+	2.5
		From 5.5 to 6.4	C	2.0
	Needs improvement	From 5.0 to 5.4	D+	1.5
		From 4.0 to 4.9	D	1.0
Fail	Not meet repuirement	Less than 4.0	F	0

II. CURRICULUM DESCRIPTION

2.1 Curriculum Structure

The curriculum structure is divided into six clusters, including compulsory and elective courses with credits of each courses given in Table 2.1

Table 2.1 Curriculum clusters and credit number

STT	Cluster	Credit	
		Compulsory	Elective
I	Maths & Natural Sciences	31	-
II	General Knowledge	17	-
III	Supporting	9	-
IV	Engineering Fundermentals	42	-
V	Projects & Internships	15.5	12
VI	Proffessional Engineering	22	4.5
Total:		136.5	16.5
		153	

Maths & Natural Science consist of 31 credits including math, statistics, physics, and chemistry, provide students with the full foundation of math and natural science that are essential for other courses of engineering science.

Engineering Fundermentals consist of 42 credits which provide background knowledge in specific majors or in broaden majors. In this way, students can then study more specific major. Specialized courses have 26.5 credits (22 compulsory and 4.5 elective credits). These courses provide in-depth knowledge and basic practical skills in specific major

Proffessional Engineering consists of 26.5 credits (22 compulsory and 4.5 elective credits) which include courses providing in-depth knowledge and basic practical skills in specific major.

Projects & Internships consist of 28 credits (15.5 compulsory and 12.5 elective credits), including courses providing students the ability to apply engineering knowledge and design process in calculation, design and solution proposing and solving a technical problem.

General Knowledge consists of 17 credits including courses in politics, economics, IT. This knowledge helps students be aware of their civic responsibility and their social and environmental awareness.

Supporting consists of 9 credits including soft skills and foreign language, physical education, military education (excluding credit) to improve English communication skills for woking, as well as soft skills in communication, teamwork, leadership and project management.

The knowledge clusters are designed to meet the requirements of PLO. This is showed in the mapping in Table 2.2.

Table 2.2 Mapping between program clusters and PLOs

Clusters		Credit number	Weight	PLOs										
				1	2	3	4	5	6	7	8	9	10	11
I	Maths & Natural Sciences	31	20.3%	H	H	H	M	-	-	L	H	-	H	H
II	General Knowledge	17	11.1%	-	L	-	M	-	-	-	H	-	H	H
III	Supporting	9	5.9%	-	-	-	-	H	-	M	-	H	H	M
IV	Engineering Fundermentals	42	27.4%	H	H	H	M	M	H	M	-	-	M	-
V	Projects, Internships & Graduation	27.5	18.0%	H	H	H	M	H	H	H	H	M	-	H
VI	Proffessional Engineering	26.5	17.3%	H	H	H	H	H	H	H	-	L	-	M
TOTAL		**153**	**100%**	**H**	**H**	**H**	**H**	**H**	**H**	**H**	**H**	**H**	**H**	**H**

Notes: H – High, M – Medium, L – Low

2.2 Course List

STT	Code	Subjects	Credits				
			Theory	Practice, Experiment	Project	Field Trip	Total
I. Maths & Natural Sciences			**30**	**1**	**0**	**0**	**31**
1	3190111	Calculus 1	4				4
2	3190121	Calculus 2	4				4
3	3060303	General Chemistry	2				2
4	3050011	Physics 1	3				3
5	3190041	Probability & Statistics	3				3
6	3190131	Algebra	3				3
7	3050641	Physics 2	3				3
8	3050651	Physical Experiment		1			1
9	1091012	Linear Programming	3				3
10	1091022	Mathematics Special Subject	3				3
11	1170011	Civil Environment	2				2
II. General Knowledge			**16**	**1**	**0**	**0**	**17**
12	1020691	General Informatics	2				2

13	1020701	General Informatics Practice		1			1
14	2090131	Marxism-Leninism 1	2				2
15	2090141	Marxism-Leninism 2	3				3
16	2090101	Ho Chi Minh Ideology	2				2
17	2090121	Revolution Lines of Vietnam Communist Party	3				3
18	2100010	Genaral Law	2				2
19	1180853	Construction Economy	2				2
III. Supporting			**9**	**0**	**0**	**0**	**9**
20		Army education					0
21	130011	Physical Education 1					0
22	130021	Physical Education 2					0
23	130031	Physical Education 3					0
24	130041	Physical Education 4					0
25	130051	Physical Education 5					0
26	4130501	Foreign Language 1	3				3
27	4130311	Foreign Language 2	4				4
28	4130143	English for Road and Bridge	2				2
IV. Engineering Fundermentals			**40**	**2**	**0**	**0**	**42**
29	1080011	Descriptive Geometry	2				2
30	1080401	Engineering Drawing	2				2
30	1050931	Electrical Engineering	2				2
31	1080700	Theoretical Mechanics	3				3
32	1110023	Hydraulic Laboratory		0.5			0.5
33	1090372	Geodesy	2				2
34	1100102	Steel Structure 1	2				2
35	1080710	Strength of Materials	3				3
36	1111272	Basic Hydraulics	2				2
37	1090033	Civil Geology	2				2
38	1102080	Construction Machines	2				2
39	1090970	Soil Mechanics	2				2

40	1090462	Soil Mechanics Laboratory		0.5			0.5
41	1040451	Thermal Engineering	2				2
42	1100022	Structure Mechanics 1	3				3
43	1110083	Civil Hydrography 1	2				2
44	1090382	Construction Mateials	2				2
45	1090980	Construction Mateials Laboratory		1			1
46	1102050	Structure Mechanics 2	2				2
47	1100062	Reinforced Concrete Structure	3				3
48	1090990	Foundations	2				2
V. Projects, Internships & Graduation			**0**	**0**	**20**	**7.5**	**27.5**
49	1100313	Concrete Structure Design Project			1		1
50	1090093	Foundations Project			1		1
51	1091300	Introduction to Bridge Engineering Project			1		1
52	1091020	Concrete Bridge Design Project			1		1
53	1091073	Bridge Substructure Project			1		1
54	1091743	Steel Bridge Design Project			1		1
55	1091023	Road Geometric Design Project			1		1
56	1091053	Roadbed - Pavement Design Project			1		1
57	1091093	Roadbed Construction Project			1		1
58	1091113	Pavement Construction Project			1		1
59	1090043	Civil Geology Practice				0.5	0.5
60	1090752	Geodesy Practice				1	1
61	1090103	Worker Internship				2	2
62	1091000	Career Awareness Internship				2	2
Va. Selective Subjects Specialized Bridge and Tunnel							
63	1091123	Bridge Graduation Practice				2	2
64	1090363	Bridge Graduation Project			10		10
Vb. Selective Subjects Specialized Highway Engineering							
65	1091133	Highway Graduation Internship				2	2
66	1091290	Highway Graduation Project			10		10

VI. Proffessional Engineering			**26**	**0.5**	**0**	**0**	**26.5**
67	1091013	Introduction to Bridge Engineering	2				2
68	1091033	Concrete Bridge	3				3
69	1091063	Bridge Substructure	3				3
70	1091733	Steel Bridge	3				3
71	1090473	Road Geometric Design	3				3
72	1091043	Roadbed - Pavement Design	3				3
73	1091083	Highway Roadbed Construction	3				3
74	1091103	Highway Pavement Construction	2				2
VIa. Selective Subjects Specialized Bridge and Tunnel							
75	1091143	Bridge Operation and Testings	2				2
76	1091153	Bridge Testing Lab		0.5			0.5
77	1090323	Advanced Topics in Bridge Engineering	2				2
VIb. Selective Subjects Specialized Highway							
78	1091163	Highway Operating and Experiment	2				2
79	1091173	Highway Experiment Practice		0.5			0.5
80	1091183	Urban Transport and Roadway Design	2				2

2.3 Mapping Courses – Program Learning Outcomes

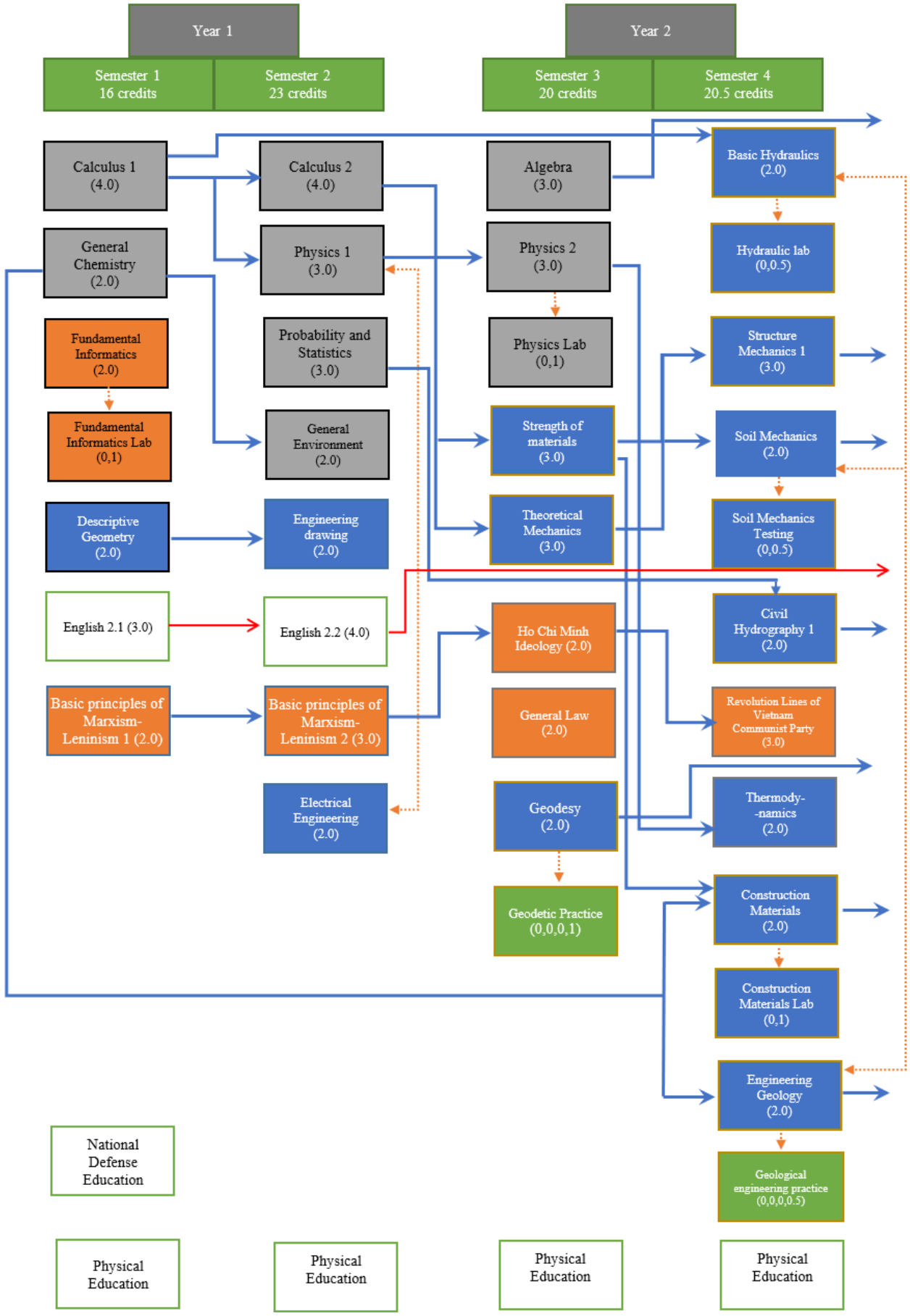
Note: H (High), M (Medium), L (Low).

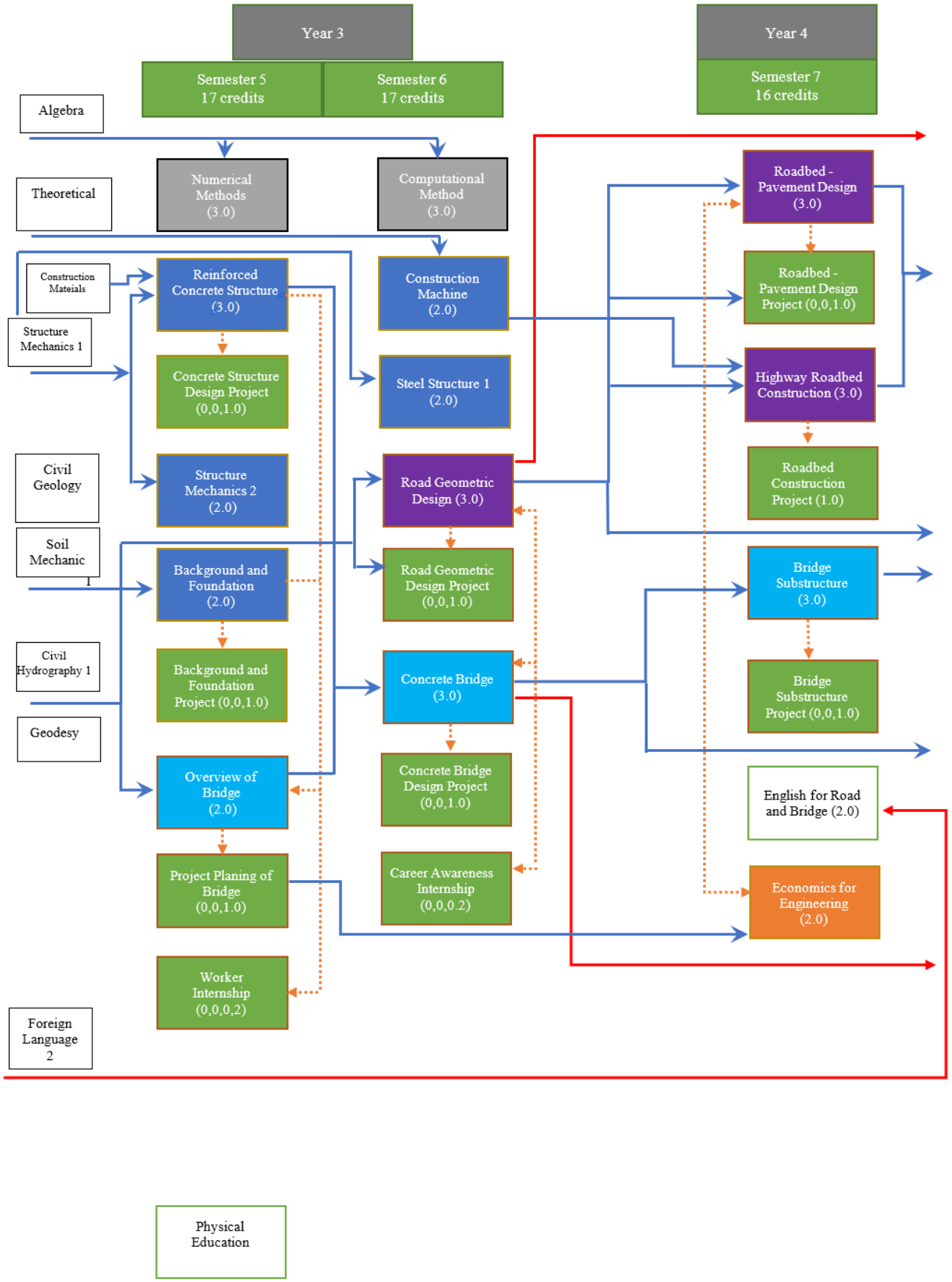
No	Code	Subjects	PLOs										
			1	2	3	4	5	6	7	8	9	10	11
I. Maths & Natural Sciences													
1	3190111	Calculus 1	H	H	-	-	-	-	-	-	-	H	-
2	3190121	Calculus 2	H	H	-	-	-	-	-	-	-	H	-
3	3060303	General Chemistry	H	-	-	-	-	-	-	-	-	-	-
4	3050011	Physics 1	H	-	L	-	-	-	-	-	-	-	-
5	3190041	Probability & Statistics	H	-	H	-	-	-	-	-	-	H	-
6	3190131	Algebra	H	H	H	-	-	-	-	-	-	H	-
7	3050641	Physics 2	H	-	-	-	-	-	-	-	-	-	-
8	3050651	Physical Experiment	H	-	M	-	-	-	L	-	-	-	-
9	1091012	Numerical Methods	H	-	H	L	-	-	-	-	-	H	-
10	1091022	Mathematics Special Subject	H	H	-	M	-	-	L	-	-	H	-
11	1170011	Civil Environment	M	H	-	-	-	-	-	H	-	H	H
II. General Knowledge													
12	1020691	General Informatics	-	-	-	M	-	-	-	-	-	H	-

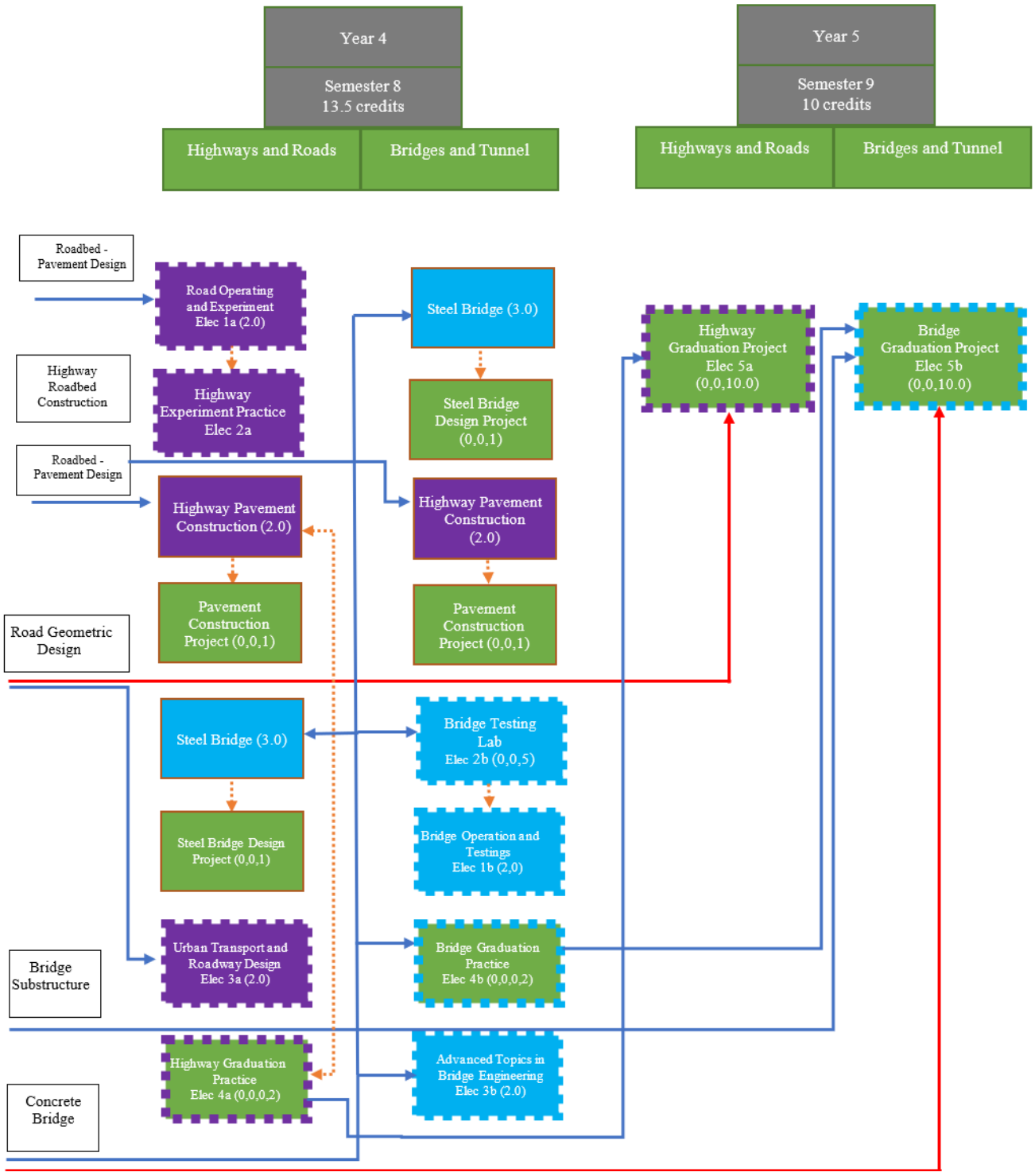
13	1020701	General Informatics Practice	-	-	-	M	-	-	-	-	-	H	-
14	2090131	Marxism-Leninism 1	-	-	-	-	-	-	-	H	-	H	L
15	2090141	Marxism-Leninism 2	-	-	-	-	-	-	-	H	-	H	L
16	2090101	Ho Chi Minh Ideology	-	-	-	-	-	-	-	H	-	H	H
17	2090121	Revolution Lines of Vietnam Communist Party	-	-	-	-	-	-	-	H	-	H	L
18	2100010	Genaral Law	-	-	-	-	-	-	-	H	-	H	H
19	1180853	Construction Economy	-	L	-	-	-	-	-	-	-	-	L
III. Supporting													
20		Army Education	-	-	-	-	-	-	M	-	-	-	M
21	130011	Physical Education 1	-	-	-	-	-	-	M	-	-	M	-
22	130021	Physical Education 2	-	-	-	-	-	-	M	-	-	M	-
23	130031	Physical Education 3	-	-	-	-	-	-	M	-	-	M	-
24	130041	Physical Education 4	-	-	-	-	-	-	M	-	-	M	-
25	130051	Physical Education 5	-	-	-	-	-	-	M	-	-	M	-
26	4130501	Foreign Language 1	-	-	-	-	H	-	-	-	H	H	-
27	4130311	Foreign Language 2	-	-	-	-	H	-	-	-	H	H	-
28	4130143	English for Road and Bridge	-	-	-	-	H	-	M	-	H	H	-
IV. Engineering Fundermentals													
29	1080011	Descriptive Geometry	-	M	-	-	-	L	-	-	-	L	-
30	1080401	Engineering Drawing	-	H	-	-	-	H	-	-	-	L	-
30	1050931	Electrical Engineering	L	L	-	-	-	-	-	-	-	-	-
31	1080700	Theoretical Mechanics	M	-	-	-	-	-	-	-	-	M	-
32	1110023	Hydraulic Experiments	L	-	H	L	M	-	M	-	-	-	-
33	1090372	Geodesy	M	H	H	-	-	M	-	-	-	M	-
34	1100102	Steel Structure 1	M	M	-	-	-	L	-	-	-	M	-
35	1080710	Strength of Materials	H	H	-	-	-	H	-	-	-	M	-
36	1111272	Basic Hydraulics	M	H	-		-	H	-	-	-	M	-
37	1090033	Civil Geology	-	H	-	-	-	M	-	-	-	M	-
38	1102080	Construction Machines	L	H	-	-	-	-	-	-	-	-	-
39	1090970	Soil Mechanics	M	M	-	-	-	L	-	-	-	M	-
40	1090462	Soil Mechanics Practice	M	M	H	-	-	-	M	-	-	-	-
41	1040451	Thermal Engineering	M	L	-	-	-	-	-	-	-	-	-
42	1100022	Structure Mechanics 1	H	H	-	-	-	L	-	-	-	M	-
43	1110083	Civil Hydrography 1	M	H	-	-	-	L	-	-	-	M	-
44	1090382	Construction Mateials	M	H	H	-	-	M	-	-	-	M	-
45	1090980	Construction Mateials Practice	M	M	H	L	M	-	M	-	-	-	-
46	1102050	Structure Mechanics 2	H	H	-	M	-	M	-	-	-	M	-
47	1100062	Reinforced Concrete Structure	H	H	-	M	-	H	-	-	-	M	-
48	1090990	Foundations	H	H	-	-	-	H	-	-	-	M	-
V. Projects, Internships & Graduation													
49	1100313	Concrete Structure Design Project	H	H	-	M	H	H	H	-	-	-	M
50	1090093	Foundations Project	H	H	-	M	H	H	H	-	-	-	M
51	1091300	Project Planing of Bridge	H	H	-	M	H	H	H	H	-	-	M
52	1091020	Concrete Bridge Design Project	H	H	-	M	H	H	H	L	-	-	M

53	1091073	Bridge Substructure Project	H	H	-	M	H	H	H	L	-	-	M
54	1091743	Steel Bridge Design Project	H	H	-	M	H	H	H	L	-	-	M
55	1091023	Road Geometric Design Project	H	H	-	M	H	H	H	H	-	-	M
56	1091053	Roadbed - Pavement Design Project	H	H	-	M	H	H	H	L	-	-	M
57	1091093	Roadbed Construction Project	H	H	-	M	H	H	H	L	-	-	M
58	1091113	Pavement Construction Project	H	H	-	M	H	H	H	L	-	-	M
59	1090043	Civil Geology Practice	-	H	M	-	H	L	H	-	-	-	L
60	1090752	Geodesy Practice	M	H	H	-	H	L	H	-	-	-	L
61	1090103	Worker Internship	-	H	M	-	H	L	H	M	-	-	L
62	1091000	Career Awareness Internship	-	H	M	-	H	L	H	H	-	-	H
Va. Selective Subjects specialized Bridge and Tunnel													
74	1091123	Bridge Graduation Practice	-	H	-	H	H	H	H	H	-	-	H
75	1090363	Bridge Graduation Project	H	H	M	H	H	H	H	H	M	-	H
Vb. Selective Subjects Specialized Highway													
79	1091133	Highway Graduation Internship	-	H	-	H	H	H	H	H	-	-	H
80	1091290	Highway Graduation Project	H	H	M	H	H	H	H	H	M	-	H
VI. Proffessional Engineering													
63	1091013	Overview of Bridge	M	H	-	-	-	H	-	-	L	-	M
64	1091033	Concrete Bridge	H	H	-	-	-	H	-	-	L	-	M
65	1091063	Bridge Substructure	H	H	-	-	-	H	-	-	L	-	M
66	1091733	Steel Bridge	H	H	-	-	-	H	-	-	L	-	M
67	1090473	Road Geometric Design	H	H	-	-	-	H	-	-	L	-	M
68	1091043	Roadbed - Pavement Design	H	H	-	-	-	H	-	-	L	-	M
69	1091083	Highway Roadbed Construction	H	H	-	-	-	H	-	-	L	-	M
70	1091103	Highway Pavement Construction	H	H	-	-	-	H	-	-	L	-	M
VIa. Selective Subjects Specialized Bridge and Tunnel													
71	1091143	Bridge Operation and Testings	H	H	M	L	M	M	M	-	L	-	-
72	1091153	Bridge Testing Lab	H	H	H	H	M	M	M	-	L	-	-
73	1090323	Advanced Topics in Bridge Engineering	M	H	-	-	-	-	M	-	L	-	-
VIb. Selective Subjects Specialized Highway													
76	1091163	Highway Operating and Experiment	H	H	M	L	L	M	M	-	L	-	-
77	1091173	Highway Experiment Practice	H	H	H	H	L	M	M	-	L	-	-
78	1091183	Urban Transport and Roadway Design	M	H	-	-	-	-	M	-	L	-	-

2.4 Curriculum Roadmap



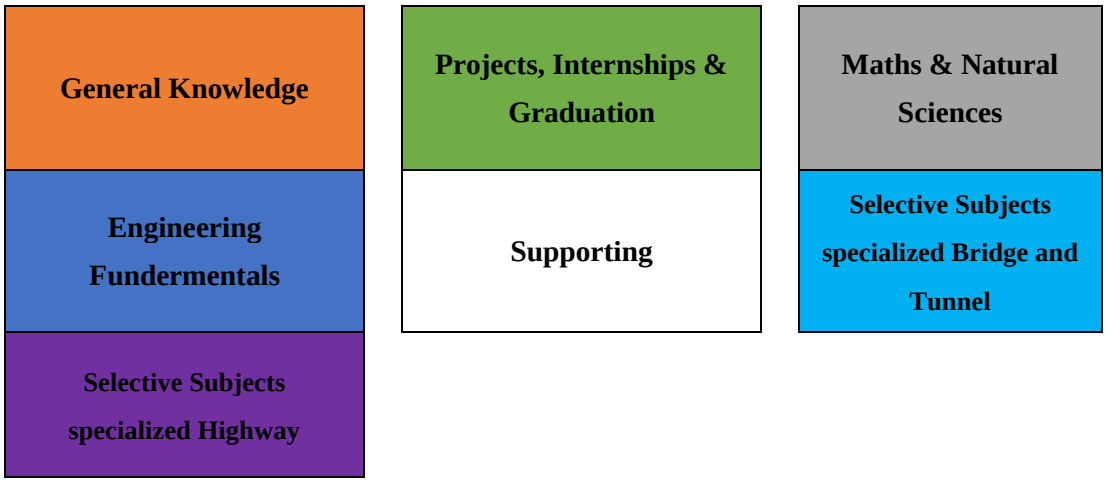

Year 3
Semester 5
17 credits
Semester 6
17 credits
Year 4
Semester 7
16 credits
Algebra
Theoretical
Numerical Methods (3.0)
Computational Method (3.0)
Construction Mateials
Structure Mechanics 1
Reinforced Concrete Structure (3.0)
Concrete Structure Design Project (0,0,1.0)
Construction Machine (2.0)
Steel Structure 1 (2.0)
Civil Geology
Soil Mechanic 1
Structure Mechanics 2 (2.0)
Background and Foundation (2.0)
Background and Foundation Project (0,0,1.0)
Road Geometric Design (3.0)
Road Geometric Design Project (0,0,1.0)
Civil Hydrography 1
Geodesy
Overview of Bridge (2.0)
Project Planing of Bridge (0,0,1.0)
Worker Internship (0,0,0,2)
Concrete Bridge (3.0)
Concrete Bridge Design Project (0,0,1.0)
Career Awareness Internship (0,0,0.2)
Roadbed - Pavement Design (3.0)
Roadbed - Pavement Design Project (0,0,1.0)
Highway Roadbed Construction (3.0)
Roadbed Construction Project (1.0)
Bridge Substructure (3.0)
Bridge Substructure Project (0,0,1.0)
English for Road and Bridge (2.0)
Economics for Engineering (2.0)
Foreign Language 2
Physical Education


Year 4
Semester 8
13.5 credits
Highways and Roads
Bridges and Tunnel
Year 5
Semester 9
10 credits
Highways and Roads
Bridges and Tunnel
Roadbed - Pavement Design
Road Operating and Experiment Elec 1a (2.0)
Steel Bridge (3.0)
Highway Graduation Project Elec 5a (0,0,10.0)
Bridge Graduation Project Elec 5b (0,0,10.0)
Highway Roadbed Construction
Highway Experiment Practice Elec 2a
Steel Bridge Design Project (0,0,1)
Roadbed - Pavement Design
Highway Pavement Construction (2.0)
Highway Pavement Construction (2.0)
Pavement Construction Project (0,0,1)
Pavement Construction Project (0,0,1)
Road Geometric Design
Steel Bridge (3.0)
Bridge Testing Lab Elec 2b (0,0,5)
Steel Bridge Design Project (0,0,1)
Bridge Operation and Testings Elec 1b (2,0)
Urban Transport and Roadway Design Elec 3a (2.0)
Bridge Graduation Practice Elec 4b (0,0,0,2)
Bridge Substructure
Highway Graduation Practice Elec 4a (0,0,0,2)
Advanced Topics in Bridge Engineering Elec 3b (2.0)
Concrete Bridge

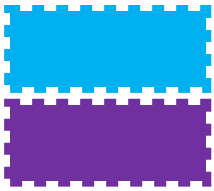
Note:

1. The prerequisite course is the course that has been studied before and must be achieved
2. Previous course is the course that has been studied before (and may not be achieved)
3. The parallel course is the course studied at the same time or has been studied before.

Cluster:



With:

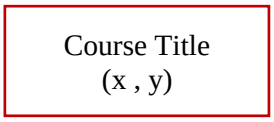


Selective Subjects specialized Bridge and Tunnel

Selective Subjects specialized Highway

Compulsory knowledge of either Highway Engineering or Bridge Engineering

4.



x: Number of lecture credits
y: Number of practice credits

5. Relation:

: Prerequisite course (*the course at the end of arrow is the prerequisite course of that one in arrowhead)*

: Previous course *(the course at the beginning of arrow is the previous course of that one in arrowhead)*

: Parallel course *(According to the direction of arrow, course at the end of arrow might be studied without studying simultaneously/pre-studying prerequisite course at in arrowhead; In contrast, course in the arrowhead must be studied simulteniously/pre-studied with that one at the end of the arrow)*

2.5 Study Plan

Semester	Total of Credits	No	Code	Subject	Theory	Lab	Project	Practice	Condition		
									Prerequisite	Previous	Parallel
1	16	1	3190111	Calculus 1	4						
		2	3060303	General Chemistry	2						
		3	1020691	General Informatics	2						
		4	1020701	General Informatics Practice		1					1020691 General Informatics
		5	1080011	Descriptive Geometry	2						
		6	4130501	Foreign Language 1	3						
		7	130011	Physical Education 1							
		8		Army education							
		9	2090131	Marxism-Leninism 1	2						
2	23	1	2090141	Marxism-Leninism 2	3					2090131 Marxism-Leninism 1	
		2	3190121	Calculus 2	4					3190111 Calculus 1	
		3	3050011	Physics 1	3					3190111 Calculus 1	
		4	4130311	Foreign Language 2	4				4130501 Foreign Language 1		
		5	1080401	Engineering Drawing	2					1080011 Descriptive Geometry	
		6	1170011	Civil Environment	2					3060303 General Chemistry	
		7	130021	Physical Education 2							
		8	3190041	Probability & Statistics	3						
		9	1050931	Electrical Engineering	2						305001 Physics 1
		1	2090101	Ho Chi Minh Ideology	2					2090141 Marxism-Leninism 2	
		2	3190131	Algebra	3						
		3	3050641	Physics 2	3					305001 Physics 1	
		4	3050651	Physical Experiment		1					3050641 Physics 1

3	**20**	5	1080700	Theoretical Mechanics	3					3190121 Calculus 2	
		6	130031	Physical Education 3							
		7	1090372	Geodesy	2						
		8	1090752	Geodesy Practice				1			1090372 Geodesy
		9	2100010	Genaral Law	2						
		10	1080710	Strength of Materials	3					3190121 Calculus 2	
		11	130031	Physical Education 3							
		1	2090121	Revolution Lines of Vietnam Communist Party	3					2090101 Ho Chi Minh Ideology	
		2	1111272	Basic Hydraulics	2					3190111 Calculus 1	
		3	1110023	Hydraulic Experiments		0.5					1111272 Basic Hydraulics
		4	1090033	Civil Geology	2					3060303 General Chemistry	1111272 Basic Hydraulics
		5	1090043	Civil Geology Practice				1			1090033 Civil Geology
		6	1090970	Soil Mechanics	2					1080710 Strength of Materials	1111272 Basic Hydraulics
		7	1090462	Soil Mechanics Practice		0.5					1090970 Soil Mechanics
4	**20.5**	8	1040451	Thermal Engineering	2					3050641 Vật lý 2	
		9	1100022	Structure Mechanics 1	3					1080700 Theoretical Mechanics	
		10	1110083	Civil Hydrography 1	2					3190041 Probability & Statistics	
		11	130041	Physical Education 4							
		12	1090382	Construction Mateials	2					3060303 General Chemistry ;1080710 Strength of Materials	
		13	1090980	Construction Mateials Practice		1					1090382 Construction Mateials

		1	1102050	Structure Mechanics 2	2					1100022 Structure Mechanics 1	
		2	1100062	Reinforced Concrete Structure	3					1100022 Structure Mechanics 1; 1090382 Construction Mateials	1091013 Overview of Bridge
		3	1100313	Concrete Structure Design Project			1				1100062 Reinforced concrete structure
		4	1090990	Foundations	2					1090970 Soil Mechanics; 1090033 Civil Geology	1091013 Overview of Bridge
5	**17**	5	1090093	Foundations Project			1				1090990 Foundations
		6	1091013	Overview of Bridge	2					1090372 Geodesy; 1110083 Civil Hydrography 1	
		7	1091300	Project Planing of Bridge	1						1091013 Overview of Bridge
		8	1090103	Civil Laborer Practice (6 weeks)				2			1100062 Reinforced concrete structure
		9	1091012	Numerical Methods	3					3190131 Algebra	
		10	130051	Physical Education 5							
		1	1091033	Concrete Bridge	3					1100062 Reinforced concrete structure	
		2	1091020	Concrete Bridge Design Project			1				1091033 Concrete Bridge
		3	1090473	Road Geometric Design	3					1090372 Geodesy; 1110083 Civil Hydrography 1	1091033 Concrete Bridge
		4	1091023	Road Geometric Design Project			1			1090372 Geodesy; 1110083 Civil	1090473 Road Geometric Design

										Hydrography 1	
6	**17**	5	1100102	Steel Structure 1	2					1100022 Structure Mechanics 1	
		6	1102080	Construction Machines	2					1080700 Theoretical Mechanics	
		7	1091022	Mathematics Special Subject	3					3190131 Algebra	
		8	1091000	Career Awareness Internship				2			1091033 Concrete Bridge;
Highway Roadbed Construction Project		1	1091083	Highway Roadbed Construction	3					1090473 Road Geometric Design 1102080 Construction Machines	
		2	1091093				1				1091083 Highway Roadbed construction
		3	1091063	Bridge Substructure	3					1091033 Concrete Bridge	
		4	1091073	Bridge Substructure project			1				1091063 Bridge Substructure
7	**16**	5	1091043	Roadbed - Pavement Design	3					1090473 Road Geometric Design	1180853 Construction Economy
		6	1091053	Roadbed - Pavement Design Project			1				1091043 Roadbed - Pavement Design
		7	4130143	English for Road and Bridge	2				4130311 Foreign Language 2		
		8	1180853	Construction Economy	2					1091300 Project planing of bridge	

		1	1091733	Steel Bridge	3					1091033 Concrete Bridge	
		2	1091743	Steel Bridge Design Project			1				1091733 Steel Bridge
		3	1091103	Highway Pavement Construction	2					1091083 Highway Roadbed Construction 1091043 Roadbed - Pavement Design	
		4	1091113	Highway Pavement Construction Project			1				1091103 Highway Pavement Construction
8	**13.5**	5 (TC 1a)	1091163	Highway Operating and Experiment	2					1091043 Roadbed - Pavement Design	
		6 (TC 2a)	1091173	Highway Experiment Practice		0.5					1091163 Highway Operating and Experiment
		7 (TC 3a)	1091183	Urban Transport and Roadway Design	2					1090473 Road Geometric Design	
		8 (TC 4a)	1091133	Highway Graduation Internship				2			1091103 Highway Pavement Construction
		9 (TC 1b)	1091143	Bridge Operation and Testings	2					1091033 Concrete Bridge	
		10 (TC 2b)	1091153	Bridge Testing Lab		0.5				1091033 Concrete Bridge	1091143 Bridge Operation and Testings
		11 (TC 3b)	1090323	Advanced Topics in Bridge Engineering	2					1091033 Concrete Bridge	
		12 (TC 4b)	1091123	Bridge Graduation Practice				2		1091033 Concrete Bridge	
9	**10**	1 (TC 5a)	1091290	Highway Graduation Project			10		1090473 Road Geometric Design	1091133 Highway Graduation Internship	

		1 (TC 5b)	1090363	Bridge Graduation Project			10		1091033 Concrete Bridge	1091063 Bridge Substructure 1091123 Bridge Graduation Practice	

2.6 Courses Description

I. Maths and Natural Sciences

3190111 Calculus 1 (4)

This module provides the basics of limits, continuity, differential calculus, integral calculus, and the extreme problem of one variable and multiple functions. The module also mentions some applications of differential geometry.

3190121 Calculus 2 (4)

This module introduces concepts, formulas and some applications of integrin (2 layers and 3 layers), line integrals (type 1, type 2), surface integrals (types 1 and 2), string (string, string) and differential equations.

3060303 General Chemistry (2)

This course aims to provide students basic knowledge of chemistry that enable them to read and understand materials in chemistry-related science and technology, namely: basic concepts, basic laws of chemistry; atomic structure; the periodic table and the periodic laws; chemical bonding and condensed states of matter, mainly on crystals; basic principles of thermodynamic; dynamic chemistry, electrochemistry.

3050011 Physics 1 (3)

Physics 1 presents knowledge relative to Mechanics, Electricity and Magnetism which includes: (i) Laws, theorem of motions of particles, system of particles, and rigid bodies; (ii) Laws of conservation of momentum and energy in motion and collisions; (iii) Properties and laws of interactions in electric field and magnetic field, motions of charged particle in the field.

1091012 Probability and Statistics (3)

The module presents probability theory and statistical methods as the basis for the statistical application modules in the research. The section includes probability theory and mathematical statistics. Probability theory introduces the basic contents of random events, probabilities; Random variables and probability distributions; limit theorems; random vector, conditional expectation, covariance, and correlation coefficient. Statistics include the basic contents of sample theory, descriptive statistics; methods of estimating parameters of random variables; Test the statistical hypothesis, the comparison problem.

3190041 Algebra (3)

The module presents the linear algebra theory as the basis for the specialized applied sciences. The modules include matrix theory, determinants, linear systems, vector space, linear mapping and quadratic forms.

3050641 Physics 2 (3)

The course includes Thermodynamics, Optics and Modern Physics.

Thermodynamics consisting of Molecular physics and Laws of thermodynamics tends to give students opportunity to explore. The motion of gas molecules, the definition of quantities characteristic of thermodynamic systems such as pressure, temperature, volume and the relations among them. The concept of internal energy, the conservation of energy of gases, laws of thermodynamics and their applications. Thermodynamics also addresses real gases, liquid and phase transformations.

Optics gives students opportunity to study phenomena related to the wave nature of light such as interference, diffraction, and polarization. Modern Physics introduces the theories developed since 20^{th} century including Quantum Optics, Quantum Mechanics and Atomic Physics. Quantum Optics is about thermal radiation with the ultraviolet catastrophe, Planck's hypothesis, the quantum theory of light and explanation of the particle nature of light through the photoelectric and Compton effects. Quantum Mechanics covers the wave nature and wave function of micro-particles, the Schrodinger equation and its application to problems of particle in a well of infinite height and tunneling effect. Atomic Physics is focused on the application of quantum mechanics to the study of the hydrogen atom and single-electron ions with and without magnetic field.

3050651 Physic Lab (1)

This course includes experiments about Mechanis, Thermodynamics, Electricity and Magnetism and Optics.

1091012 Specialized Mathematics (3)

The subject introduces practical problems that the linear programming model is often used to solve. This course equips students with general knowledge of linear programming; duality theory; methods and tools to address different levels of use. The focus of this course is on introducing the types and methods of solving practical problems in transportation construction engineering

1091022 Numeric Methods (3)

This course is an introduction to the numerical methods. The primary objective of the course is to develop the basic understanding of numerical algorithms and skills to implement algorithms to solve mathematical problems on the computer. The finite element methods will be introduced in this course. This helps students to analyze some types of structures. This course is to help students to update the advanced science and technologies in transportation construction engineering and infrastructure planning.

1170011 Environment (2)

This subject is belonging to the general education, providing students with a basic understanding of the environment, resources and ecosystems. The knowledge of pollution in air, water, soil, solid waste and other types of pollution such as noise, heat and radiation; Because of that, the daily solution for environmental pollution can be implemented. In addition, the course also helps students understand the concepts, principles and solutions to achieve the environmental harmony and sustainable development as well as some key contents of Vietnam's environmental law.

II. General Knowledge

1020691 General Informatic (2)

This course aims to provide students with basic knowledge of computing and how to use basic applications on operating systems, MS Word, MS Excel, MS PowerPoint, and services on the internet. The course also presents how to use C programming language to solve some basic math problems.

1020701 General Informatic Lab (1)

This course aims to provide students with basic knowledge of computing and how to use basic applications on operating systems, MS Word, MS Excel, MS PowerPoint, and services on the internet. The course also presents how to use C programming language to solve some basic math problems.

2090131 Marxism-Leninism Principles 1 (3)

The module provides basic knowledge of Marxism-Leninism: material and consciousness; pairs of categories of materialist dialectics; the role of production and rules of production relations in line with the development level of the productive forces; infrastructure and superstructure; class and class struggle; the people and the creative role of the history of the people.

2090141 Marxism-Leninism Principles 2 (2)

The module is equipped with knowledge of the doctrine of Marxism Leninism in commodity economics, the mode of capitalist production in both periods of freedom of competition and the monopoly period. The theory of Leninism on socialism, the study of the economic, political and social issues of the communist model.

2090101 Ho Chi Minh Thought (2)

The module provides the basic contents of Ho Chi Minh's thoughts on: Ethnic issues and the revolution of national liberation; on socialism; about the Communist Party of Vietnam; about the great unity; the construction of a new state in Vietnam and the ethics, culture and the construction of new people ... along with the creation of theory and practice directed the democratic national revolution and social Vietnam's Ho Chi Minh.

2090121 Revolutionary Policies of the Communist Party (3)

The module focuses on clarifying the birth of the Communist Party of Vietnam, the policy of fighting for power, national liberation, reunification of the motherland; the way of industrialization, the building

of a socialist-oriented market economy, the building of the political system, the development of the culture, the settlement of social issues and the foreign policy.

2100010 General Law (2)

The General Law course has been designed to provide learners with the most basic knowledge about the state and the law, such as: State apparatus, legal norms and legal relationships, law violations ... The course also provides some basic knowledge about Civil Law, Administrative Law, Criminal Law and Anti-Corruption Law.

1180853 Economics in TCE (2)

This course is to help students to have some fundamental knowledge in construction economics. It also introduces the legal obligations which are needed to obey in project management. The course covers some important topics: types of construction investment projects in Vietnam; management and design organization; methods of evaluating solutions for designing transportation construction projects.

III. Supporting Courses

4130501 English A2.1 (3)

This module is designed to integrate four skills: Listening, Speaking, Reading and Writing along with grammar points. Course content is presented in 3 units; Each unit consists of 7 lessons on: A. vocabulary and listening comprehension skills; B. grammar skills; C. cultural knowledge; D. grammar skills; E. reading and listening skills; F. skills in oral communication; G. writing skills in English

Each unit of integrated skills will have a unit of study and skill development, to help learners develop their writing skills, prepare them for the 1st and 2nd quizzes. The format of the test consists of Listening / Reading, choosing the correct / wrong / not mentioned in the lesson; Multiple choice exercises; Fill in (Grammar); Picture-based discussions; Role playing (speaking); Multiple choice (Reading); Write by topic.

4130311 English A2.2 (4)

This module is designed to integrate the four skills of Listening, Speaking, Reading, and Writing along with grammar points. Course content is presented in 4 units; Each unit consists of 8 lessons: A. vocabulary and listening comprehension skills; B. grammar skills; C. cultural knowledge; D. grammar skills; E. reading and listening skills; F. skills in oral communication; G. writing skills in English.

4130143 English for Road and Bridge Engineering (2)

English for Road and Bridge course provides students with basic knowledge of English in the field of transportation and construction engineering. From there, students are introduced to specialized English terms, more confident in searching and reading specialized English documents and are able to write and present simple reports by English. In addition, the course provides students with practical knowledge through the materials and videos that the lectuerers provide throughout the learning process.

IV. Engineering and Civil Engineering Fundermentals

1080011 Descriptive Geometry (2)

Descriptive geometry is the branch of geometry which allows the representation of three-dimensional objects in two dimensions, by using a specific set of procedures. The resulting techniques are important for engineering, architecture, design and in art. The education in Descriptive Geometry provides a training of the students' intellectual capability of space perception. Students should be able to construct conics using their focus properties. Understand and get the basics of projection: coted, Monge`s projection, orthogonal axonometry. They should be able to solve simple 3D problems, display the basic geometric bodies and surfaces in each projection, their section. an orthogonal closed rule right helicoidal surface. They construct a prism, cone, sphere, cylinder, hyperbolic paraboloid and parabolic conoid using specified elements. They should be able to solve problems intersection of

1080401 Technical Drawing (2)

The module consists of 2 credits, aiming to equip students with methods of representing objects of space on the plane. It provides the basis for future engineers to practice space-thinking, one of the conditions for technical innovation and the solving of practical problems to apply to the preparation and reading of technical drawings. Equipping Vietnamese and international standards for the establishment of technical drawings, is the language of the engineer. This course provides the basis for future engineers to elaborate on style, accuracy. At the same time solve practical problems to apply to the drawing of technical and technology.

1050931 Electrical Engineering (2)

The course is designed to supply students with knowledge of fundamental theory about electrical engineering, as a background for other engineering subjects. The basic content of the course consists: (i) The fundamental concepts and laws of energy circuits, sine source electrical ciruits, electrical circuits problem solving methods; (ii) The concepts, structures and operation principles of electrical machine; show the equations and energy process in electrical machine and solving methods.

1080700 Theoretical Mechanics (3)

This course equips students with knowledge in mathematics, dynamics and dynamics to solve real-world math problems; provides to students with knowledge of the balance and movement of solids under the influence of external forces and interactions between objects, the basic concepts of knowledge of balance and motion of objects. in three parts of mechanics: static, dynamics, dynamics. This course particularly requires students to master the concepts and equations of balance and motion, alignment, mechanical principles. The main contents of the module include the following: basic concepts of mechanical axioms, the theory of force, equilibrium problems - basic motions of solids - Newton's laws, general theorems of dynamics.

1110023 Hydraulics Lab (0.5)

Based on the theory of the hydrostatic pressure on the pipes and its loss, students will perform test to understand the theoretical problem better. In addition, this course helps students to improve the

practical skills.

1090372 Geodesy (2)

The course is part of the basic knowledge of the major, that equips students with knowledge of map and geodetic works in service of the planning, design, construction, and management of transport works. The course includes general knowledge of geodesy, knowledge of maps and knowledge about geodetic works.

1100102 Steel Structures 1 (2)

Steel structure consists of 5 chapters. Chapter 1 briefly introduces the properties of steel and the common steel profile. Chapter 2 presents the calculation method of the limiting state, how to determine the loading capacity of the given cross section. Chapter 3 shows how to calculate weld and bolt connections. Chapters 4 and 5 help students calculate the design of bending beam and axial compressed columns. Chapter 6 gives an overview of truss structure and how to calculate normal truss.

1080710 Strength of Materials (3)

The course shows how to analyze and calculate the internal force of bar elements under basic and complex load. Basic experimental methods determine the mechanical properties of the materials as well as the force resistance of the bar structure. Analyzing the stress state in the case of complex loading to create the criteria for assessing the durability, stiffness and stability of the components to ensure the safety and economy condition.

This course includes: concepts of internal force, cross-section method, internal force diagram; stress states analysis, durability theory; the geometric characteristics of cross-sections, the mechanical characteristics of the material; basic and complex force resistance problems; calculating displacement and deformation of bar structures; solving basic problems of durability, stiffness, stability conditions; statically indeterminate structures problem.

1111272 Hydraulics (2)

This course provides the fundamental knowledge in hydraulics. This course helps students to understand the general laws of fluids in equilibrium and motion and applies them to some of the works in the field ; calculate test for general hydrodynamic problems such as hydrostatic pressure on solid walls, flow in pipes, holes in the hose. This course also trains students to be cautious, know how to apply, apply the hydraulic knowledge learned in professional work.

1090033 Engineering Geology (2)

Engineering geology subject prepares geological knowledges applying for construction work to leaners. Research object is geological environment, which includes soils & rocks distributed in upper part of ground ; generation, improvement of geoloical phenomena as the result of geololical enviroment and construction and surrounded enviroment interaction. The aim of the subject is assess construction ability of certain area in the view point of engineering geology as well as use suitably natural conditions for construction in order to assure stability of building during excuting process, use as well as protect the geological environment

1102080 Construction Machines (2)

This course introduces construction machine groups such as dump trucks, lifts, wheel loaders, compactors, material-making machines... and shows the thinking ability of using construction machines and equipment, and how to reasonably select, coordinate and effectively use machines

1090970 Soil Mechanics (2)

This unit provides students witi theorectical knowledge of soil physical and mechanical properties, determine the stress and strain in soils under loading and seft-weigth of soils, estimate the foundation settlement over time, predict the soil bearing capacity, slope stability and earth pressure for retaining walls.

1090462 Soil Machenics Laboratory (0.5)

This unit provides students with practical knowledge of soil engineering properties, testing procedures and analysis of the test results in the laboratory. Students have the apportunity to conduct, calculate and analyze the soil parameters introduced in theorectical sections.

1100022 Structural Analysis 1 (3)

This course provides students with the ability to analyze the force resistance of static linear elastic structures; the ability to determine internal force of static bar structures under static and dynamic load; Determinating displacement and deformation in static bar structures under common loads such as dead loads, thermal loads, forced bearing displacement.

1110083 Engineering Hydrology (2)

The course serves as an introduction to the field of engineering hydrology. It covers fundamentals such as the hydrological cycle, catchment, losses, hydrographs and hyetographs. Design topics covered will be selected from: flood frequency analysis, determination of design rainfall intensity and hyetographs, peak flow estimation, design hydrograph estimation, groundwater process and modelling, and drought risk analysis/yield hydrology.

1090382 Construction Materials (2)

This course provides students with fundamental knowledge of main construction materials. This knowledge is also the basic of next specific courses such as Foundation, Reinforced Concrete Structures, Concrete Technology, Technology of Binding Materials, Technology of Building Ceramics. Furthermore, this course is useful for civil engineers in designing, constructing, consulting, supervising and testing activities.

1090980 Construction Materials Lab (1)

This course provides students with fundamental knowledge about testing methods to determine physico-mechanical properties of main construction materials; how to use and operate basic test apparatus and equipment. Such knowledge is the basis for next specific courses such as Foundation, Reinforced Concrete Structures, Concrete Technology, Technology of Binding Materials, Technology

of Building Ceramics. Furthermore, what this course provides is also useful for civil engineers working in designing, constructing, consulting, supervising and testing field.

1102050 Structural Analysis 2 (2)

This course consists of 2 chapters. Chapter 1 introduces the concept of statically indeterminate structures, how to calculate the internal force and displacement of statically indeterminate structure by force method, to calculate the internal force of continuous beam by the three-moment equation and the analysis of symmetric structures. Chapter 2 shows the concept of kinematic determinacy and indeterminacy structure, how to calculate the internal force of kinematic indeterminacy structure by displacement method.

1100062 Reinforced Concrete (3)

This course consists of 10 chapters. Chapter 1 gives students an overview of reinforced concrete materials. Chapter 2 presents the material properties and behaviors, the combination between concrete and steel reinforcement. Chapter 3 introduces the principle of calculation, components, and presentation of reinforced concrete structures. Chapters 4, 5, 6, 7, 8 present load combinations, calculation and design of basic components in reinforced concrete structures. Chapter 9 presents the design of reinforced concrete structure under the second limit state (normal working conditions). Chapter 10 introduces and calculates pre-stressed reinforced concrete structures.

1090990 ***Background and Foundation (2)***

Foundations is one of the important specialized subjects for all civil engineering students. This course provides the concepts, background and principle in designing and building the foundations of the constructions. Therefore, it helps students to be able to recognize, distinguish, select, analyze and evaluate the foundation solutions (shallow foundation and deep foundation) as well as soil improvement methods when building the construction on soft soil ground. This module equippes an important knowledge about foundations so that students can apply and connect their knowledge with other subjects in the civil engineering program.

V. Projects, Internships and Graduation

1100313 Reinforced Concrete Projects (1)

Students design a complete system of reinforced concrete slab including: Preliminary selection of components, load determination, internal forces and moments calculation, evaluation of reinforced concrete slab components (floors, primary and secondary beams) as well as presentation in drawing form.

1090093 Background and Foundation Project (1)

Background and Foundations Project is module which applies knowledge of the subject: Background and Foundations, and it is one of the important specialized subjects for all civil engineering students. Based on the knowledge and the supervision of lecturers, students calculate and analyze the input data on geological features, mechanical properties of soil layers, and load to evaluate and propose solutions to the foundation. Then, student needs to select suitable material such as concrete, reinforced concrete,

and steel. It is important to calculate and design for a shallow base on the natural base and a plan of high embedment pile foundation according to the specified limit conditions. The product includes a plot illustration on A4 paper and 01 drawing presenting the design results of the foundation design on A1 paper.

1091300 Bridge Project Planning Project (1)

This course helps students to propose bridge structure plans in accordance with the requirements of the design task based on the known data of the bridge width, load, span length, hydrological data, geological data and technical specifications of the bridge. Students create a rough estimate of each plan. Analyzing and comparing the plans and proposing the optimal plan for the technical design

1091020 Reinforced Concrete Bridge Project (1)

This course requires students to calculate and design the major components of the bridge superstructure: deck, girder, cross beam ... following the requirements of the design task. The design task based on the the known data of the bridge width, load, and major technical specifications of the bridge. Students must design the construction sequence of the superstructure and show the design results by a thesis and drawings.

1091073 16 Bridge Substructure Project (1)

As a part of the bridge and tunnel construction, this course provides students with practical knowledge in the bridge substructure design and construction. Students must understand the analysis and selection of bridge substructure design as well as bridge substructure construction techniques and auxiliary resources. In addition, students must propose solutions of organization, managment and planning production of bridge substructure.

1091743 Steel Bridge Project (1)

The Steel bridge project**,** a part of bridge and tunnel construction major, provides students with practical knowledge in the design and construction of steel structures. Students have to analyze and give a reasonable design plans of steel beam of frame bridge span as well as their construction techniques and auxiliary resources for construction. In addition, students must propose solutions of organization, managment and planning production of steel structure.

1091023 Road Geometric Design Project (1)

The course is to provide students knowledge of calculating and designing process for highway, including determination of categories, calculation of technical parameters, designs for horizontal/vertical alignment and cross section, and general evaluations to have an optimal selection in order to proceed to technical road design and its construction drawings design.

1091053 Roadbed - Pavement Design Project (1)

The roadbed - pavement design project is a part of the specialized knowledge of the road design and constrcution field. The course provides students a basic understanding of road design in general and skills of calculating roadbed-pavement structure, calculating the performance criteria of a road

construction project. These can be used as foundation to compare, choose optimal roadbed-pavement structure.

1091093 Roadbed Construction Project (1)

This roadbed construction design project course is a part of the roadway and highway engineering program. The course is intended to establish the foundational knowledge for construction engineering of a drainage system and a section of roadbed in a highway route. The course will cover the construction techniques, equipments, and cost estimation of construction materials, excavation, fill embankment, gutters, drains, ditches, culverts, storm sewers, and other aspects of civil engineering construction projects by integrating geotechnical reports, materials specifications, quality control, equipment, estimation, scheduling, and design details. Finally, the student will gain the knowledge necessary to apply engineering principles in analyzing economical approaches to earthwork construction problems.

1091113 Pavement Construction Project (1)

The pavement construction project is part of the specialized knowledge of the road design and construction field. The course provides students basic understanding and skills on construction management (overall and details) of pavement. These also cover the criteria of technical construction, human resource management, machinery supply as well as requirement of construction time.

1090043 Engineering Geological Practice (1)

Engineering geological practice prepares the knowlede in using and drawing engineering geological map to learners. Recognize usual soils & rocks. Observe and assess engineering dynamic geological processes, find out the origin or the formation and the impact of these processes, then propose the suitable preventive solutions. Synthetize and analyze the data for report work.

1090752 Geodetic Practice (1)

The course is part of the basic knowledge of the major, that helps students to apply the knowledge of geodesy in the use of geodetic equipment, plotting map and performing geodetic work in planning, design, construction and management of transport works.

1090103 Worker Internship (2)

This course purposes are helping students involve construction work on the site, understand structure and order of construction items, and important points during construction processes to achieve the highest quality. Students will have an opportunity to combine between theorical issues and practical works, as well as having professional training for ethics and responsibilities on the construction site.

1091000 Career Awareness Internship (2)

Students are participate in a visit of the construction fiels in the area of Central Vietnam in order to get an overview and detail of the construction. They also observe the process of construction in practice. This is an great opportunity to link the learned theory and practice.

VI. Proffessional Engineering

1091013 Introduction to Bridge Engineering (2)

This course provides the basic concepts of artificial works on roadway(bridges and culverts). General components and main systems of the bridge; requirement and order of making plans to pass obstacle course (river, stream ...); principles of surveying, designing and calculating bridge constructions following to the current process and regulations; the general component of the bridge.

1091033 Reinforced Concrete Bridge (3)

This course provides the knowledge of designing and constructing simple reinforced concrete girder bridge. This subject plays an important role in the specialized knowledge, which create the basis knowledge, skills as well as the sense and attitude in learning of students. Completed the study, students can apply immediately to the actual work such as design, construction, investment, management, transport infrastructure planning.

1091063 Bridge Substructure (3)

The Bridge substructure**,** a part of the bridge and tunnel construction, provides students with the core knowledge of: component of many types of bridge substructure; Load and load combination on bridge substructure; Design of bridge substructure (except foundation) in limited states; Positioning bridge substructure; Solutions for construction of shallow foundation on the natural ground, precast concrete piles, bored pile, well foundation; Concrete filling technology; and bridge substructure construction solutions. Then, students can learn how to meet design and construction requirements such as: analyzing, selecting the most reasonable bridge substructure and bridge substructure design. The Analyzing, selecting the most suitable solutions for the bridge substructure ; Selecting, calculating and designing auxiliary resources and equipment for construction. Moreover, The course helps to guide the key issues of the field for scientific research such as problem posing and problem solving.

1091733 Steel Bridge (3)

This course provides the knowledge of designing and constructing static steel girder bridges and steel trusses. This course, which plays an important role in the specialized knowledge, create the basis for knowledge and skills as well as the awareness and attitude in later learning and working. Completed the study, students can apply immediately to the real work such as design, construction, investment, management, transport infrastructure planning.

1090473 Road Geometric Design (3)

The course helps students understand the sequence of surveys and highway geometric design. It involves determining road classifications, calculating and selecting technical parameters, as well as designing horizontal/ vertical alignment, cross section, drainage systems, intersections, and landscape.

1091083 Highway Roadbed Construction (3)

To provide students general knowledge about road construction, basic characteristics and basic concepts of road construction in our country. The course also introduce the principle of selecting the

machine, the use of road construction machines, the technical methods of construction, the methods of coordination of construction organization in the organization of construction work on the road and the road surface, digging in normal cases and special cases (difficult mountain areas, kart areas, soft soil, etc); The order, technique and technology of construction - inspection - acceptance of road foundation and road works; Applying modern technologies to road construction;

1091103 Highway Pavement Construction (2)

The course aims to provide students general knowledge in highway pavement construction, including flexible pavement structures, rigid pavement structures, highway materials characteristics and fundamental principles, manufacturing and processing methods; and pavement construction procedure. This course also provides basic knowledge on characteristics, classification, pros and cons, usability, structure, material requirements, construction procedure and techniques, checking and taking over pavement using non-binding, inorganic-binding and organic-binding agents. The course also helps on orientation of applied science research, development of innovative construction techniques or new pavement materials.

VI.a. Elective Courses in Bridge Engineering

1091143 Bridge Operation and Testing (2)

This cousre provides knowledge of the organization of operation, inspection, maintenance, repair and reinforcement of bridges; bridge accreditation and loading test. Testing methods for bridge are included.

1091153 Bridge Testing Lab (0.5)

This course provides students with knowledge of the experimental methods, load testing methods, load-carrying capacity and structural health monitoring that serve the construction and service process.

1090323 Advanced Topics in Bridge Engineering (2)

Advanced topics in bridge engineering, a part of bridge and tunnel construction major, provides basic knowledge of component, construction technology, calculation method of large span bridges such as continuous beam bridge, cable-stayed bridge and suspension bridge. The course also shows how to apply large span bridges on design planning in the field of traffic and urban transport with high architectural and aesthetic requirements on transport infrastructure. The course simultaneously helps to guide the key issues of the field for scientific research such as problem posing and problem solving.

1091123 Graduation Internship (2)

This course offers students opportunities to be familiar with engineers' jobs in road and bridge engineering from surveying, design and construction; research and management works related to road and bridge constructions; and data collections used for graduation project course. Students also have chances to use their knowledge to solve practical problems and to handle on-site situations.

1090363 Graduation Project on Bridge Construction (10)

The Graduation project on bridge construction is a synthesis of all basic and specialized knowledge to apply to the design and construction of bridge.

VI.b. Elective Courses in Transportation and Road Engineering

1091163 Highway Operating and Experiment (2)

The course provides basic knowledges and skills on road management tasks, road quality improvement; determining of failures and damages on road construction as well as proposing retrofit scheme; acknowledgement and understanding of concerning technical standards, details and methods of material quality testing, quality of sub-constructions in construction process, inspection on quality of road while in service.

1091173 Highway Experiment Practice (0.5)

The course provides skills to conduct the experiments of road building materials, experiments of all kinds of road foundation, road surface; calculation analysis, processing of experimental data.

1091183 Urban Transport and Roadway Design (2)

The urban transport and roadway design cousre, a part of the specialized knowledge of the road design and constrcution field, provides students with a basic understanding of the role and functions of urban transport; Classification system, hierarchy and functions of roadway; Component and design principles of road cross-section, horizontal alignment, vertical alignment; Water drainage planning. The cousre also provides knowledge on the characteristics, component and design solutions of traffic intersections in our country. The concepts of capacity and its applications in geometric, organizational design and traffic control. The course simultaneously helps to guide the key issues of the field for scientific research such as problem posing and problem solving.

1091133 Graduation Internship

This course offers students opportunities to be familiar with engineers' jobs in road and bridge engineering from surveying, design and construction; research and management works related to road and bridge constructions; and data collections used for graduation project course. Students also have chances to use their knowledge to solve practical problems and to handle on-site situations.

1091290 Graduation Project (Highway) (10)

The contents of this course are to synthesize all basic and specialized knowledge in order to design and construct highway projects. Students are able to systematically apply and synthesize knowledge learned in fields of road and bridge engineering, and to master the procedure of establishing investment projects for bridge and road works. It involves preparing investment report, project establishment, technical designs, cost estimates, as well as design and construction of a road project.

III. PROGRAM IMPLEMENTATION GUIDELINES

This program is applied from the 2015 enrollment to train regular students of Transportation Construction Engineering.

The education is based on the designed curriculum, training objectives and target audience, human resource requirements and specific conditions for training. For the elective modules, depending on the actual situation of the development trend, social needs, the Faculty will advise students to choose elective modules.

The Dean of the Faculty is responsible for organizing and instructing the disciplines to develop the syllabus in detail to ensure that the objectives, content and requirements are met and, at the same time, meet the needs of learners and the society. Based on the syllabus, the budget for practicing, field trip and additional procurement of equipment, machinery, chemicals, testing instruments for each module and the whole course is determined. Heads of concerned units shall have to inspect, evaluate and submit them to the principal for approval.

The program shall be reviewed and updated every 2-3 years, should there be any necessary to update to meet the new goals and standards. The faculty shall submit a written report to the University for consideration and settlement according to current regulations.

Danang, August 2015

Dean

(signed)

Dr. Nguyen Hong Hai

Vice. Rector

(signed)

Assoc. Prof. Le Cung